

**Practice: 468 - Lined Waterway or Outlet****Scenario: #1 - Waterway, Turf Reinforced Matting Lined****Scenario Description:**

Install 300 ' long by 15' wide by 1.5' deep trapezoidal or parabolic shaped waterway lined with Turf Reinforced Matting (TRM). 1/2 the channel is excavated. Excess excavation is spoiled in the immediate area. TRM is installed over 100% of the width of the waterway to prevent scour and aid in waterway establishment. Cost include excavation, spoiling of excess material, and furnishing and installing TRM. Lined waterway width is measured from top of bank to top of bank.

**Before Situation:**

Excessive sedimentation and soil erosion as a result of ephemeral or classic gully erosion. Velocities are generally too high or saturated soil conditions make it difficult to establish a grassed waterway.

**After Situation:**

TRM lined waterway is 300 ' long by 15' wide by 1.5' deep. The practice is installed using a hydraulic excavator. TRM is installed by laborers. Associated practices are Subsurface Drain (606), Underground Outlet (620), Structure for Water Control (587), and Critical Area Seeding (342).

**Scenario Feature Measure:** Square Foot of Waterway

**Scenario Unit:** Square Feet

**Scenario Typical Size:** 4,500

**Scenario Cost:** \$3,392.00

**Scenario Cost/Unit:** \$0.75

**Cost Details (by category):**

Component Name	ID	Component Description	Unit	Price (\$/unit)	Quantity	Cost
<b>Equipment/Installation</b>						
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic yard	\$2.00	90	\$180.00
<b>Labor</b>						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	\$37.95	4	\$151.80
<b>Materials</b>						
Turf reinforcement mat	1212	Synthetic turf reinforcement mat with staple anchoring. Includes materials, equipment and labor.	Square Yard	\$5.72	535	\$3,060.20

**Practice: 468 - Lined Waterway or Outlet****Scenario: #2 - Waterway, Lined with Riprap 12 Inches Thick****Scenario Description:**

Install 300 ' long by 15' wide by 1.5' deep trapezoidal or parabolic shaped waterway lined with riprap (D100 = 9", Velocity ~ 8 ft/sec). 1/2 the channel is excavated, before excavation for riprap. Excess excavation is spoiled in the immediate area. Riprap is installed over 100% of the width of the waterway to prevent scour. Cost include excavation, spoiling of excess material, geotextile underlayment and installing 9" Rock Riprap. Lined waterway width is measured from top of bank to top of bank.

**Before Situation:**

Excessive sedimentation and soil erosion as a result of ephemeral or classic gully erosion. Velocities are generally too high or saturated soil conditions make it difficult to establish a grassed waterway.

**After Situation:**

Rock lined waterway is 300 ' long by 15' wide by 1.5' deep. Waterway is excavated and rock is placed using a hydraulic excavator. Geotextile underlayment is installed by laborers. Associated practices are Subsurface Drain (606), Underground Outlet (620), Structure for Water Control (587), and Critical Area Seeding (342).

**Scenario Feature Measure: Square Foot of Waterway****Scenario Unit: Square Feet****Scenario Typical Size: 4,500****Scenario Cost: \$13,014.47****Scenario Cost/Unit: \$2.89****Cost Details (by category):**

Component Name	ID	Component Description	Unit	Price (\$/unit)	Quantity	Cost
<b>Equipment/Installation</b>						
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic yard	\$2.00	295	\$590.00
<b>Labor</b>						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	\$37.95	4	\$151.80
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	\$18.11	2	\$36.22
<b>Materials</b>						
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic yard	\$59.69	205	\$12,236.45

**Practice: 468 - Lined Waterway or Outlet****Scenario: #3 - Waterway, Lined with Riprap 24 Inches Thick****Scenario Description:**

Install 300 ' long by 15' wide by 1.5' deep trapezoidal or parabolic shaped waterway lined with riprap (D100 = 18", Velocity ~ 11 ft/sec). 1/2 the channel is excavated, before excavation for riprap. Excess excavation is spoiled in the immediate area. Riprap is installed over 100% of the width of the waterway to prevent scour. Cost include excavation, spoiling of excess material, geotextile underlayment and installing 18" Rock Riprap. Lined waterway width is measured from top of bank to top of bank.

**Before Situation:**

Excessive sedimentation and soil erosion as a result of ephemeral or classic gully erosion. Velocities are generally too high or saturated soil conditions make it difficult to establish a grassed waterway.

**After Situation:**

Rock lined waterway is 300 ' long by 15' wide by 1.5' deep. Waterway is excavated and rock is placed using a hydraulic excavator. Geotextile underlayment is installed by laborers. Associated practices are Subsurface Drain (606), Underground Outlet (620), Structure for Water Control (587), and Critical Area Seeding (342).

**Scenario Feature Measure:** Square Foot of Waterway

**Scenario Unit:** Square Feet

**Scenario Typical Size:** 4,500

**Scenario Cost:** \$29,053.87

**Scenario Cost/Unit:** \$6.46

**Cost Details (by category):**

Component Name	ID	Component Description	Unit	Price (\$/unit)	Quantity	Cost
<b>Equipment/Installation</b>						
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic yard	\$2.00	555	\$1,110.00
<b>Labor</b>						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	\$18.11	2	\$36.22
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	\$37.95	4	\$151.80
<b>Materials</b>						
Rock Riprap, Placed with geotextile	44	Rock Riprap, placed with geotextile, includes materials, equipment and labor to transport and place	Cubic yard	\$59.69	465	\$27,755.85

**Practice: 468 - Lined Waterway or Outlet****Scenario: #4 - Waterway, Concrete Lined****Scenario Description:**

Install 300 ' long by 15' wide by 1.5' deep trapezoidal or parabolic shaped waterway lined with concrete. 1/2 the channel is excavated, before excavation for concrete and subgrade material. Excess excavation is spoiled in the immediate area. Concrete is installed over 100% of the width of the waterway to prevent scour. Cost include excavation, spoiling of excess material, 6" of clean sand or gravel subgrade, and 5" reinforced concrete slab. Lined waterway width is measured from top of bank to top of bank.

**Before Situation:**

Excessive sedimentation and soil erosion as a result of ephemeral or classic gully erosion. Velocities are generally too high or saturated soil conditions make it difficult to establish a grassed waterway. Usually installed in locations where rock or other lining materials are not readily available.

**After Situation:**

Concrete lined waterway is 300 ' long by 15' wide by 1.5' deep. Waterway is excavated using a hydraulic excavator. Concrete slab is placed on 6" of clean sand or #57 stone. Concrete is placed, graded and screeded by laborers. Associated practices are Subsurface Drain (606), Underground Outlet (620), Structure for Water Control (587), and Critical Area Seeding (342).

**Scenario Feature Measure:** Square Foot of Waterway

**Scenario Unit:** Square Feet

**Scenario Typical Size:** 4,500

**Scenario Cost:** \$11,349.92

**Scenario Cost/Unit:** \$2.52

**Cost Details (by category):**

Component Name	ID	Component Description	Unit	Price (\$/unit)	Quantity	Cost
<b>Equipment/Installation</b>						
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic yard	\$2.00	280	\$560.00
Concrete, CIP, slab on grade, reinforced	37	Steel reinforced concrete formed and cast-in-place as a slab on grade by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	\$99.18	80	\$7,934.40
<b>Labor</b>						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	\$18.11	2	\$36.22
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	\$37.95	4	\$151.80
<b>Materials</b>						
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	\$24.25	110	\$2,667.50

**Practice: 468 - Lined Waterway or Outlet****Scenario: #5 - Gabion Mattress Outlet****Scenario Description:**

Install an open weir gabion mattress lined outlet to control soil erosion and/or provide a stable outlet for other conservation practices. Minor excavation and/or earhfill is required to install the structure. The typical structure consists of 8 - 6'x9'x9" gabion mattresses, 8 - 6'x12'x9" gabion mattresses, 28 cubic yards of rock, 10.7 cubic yards of filter material, and 112 square yards of geotextile.

**Before Situation:**

Excessive sedimentation and soil erosion is occurring as a result of ephemeral or classic gully erosion. Velocities are generally too high or saturated soil conditions make it difficult to establish a stable vegetated outlet.

**After Situation:**

An open weir gabion mattress lined outlet is installed. Minor excavation and/or earhfill is required to install the structure. The typical structure consists of 8 - 6'x9'x9" gabion mattresses, 8 - 6'x12'x9" gabion mattresses, 28 cubic yards of rock, 10.7 cubic yards of bedding material, and 112 square yards of geotextile. Earthwork, bedding material, and rock is installed using a backhoe and laborers. Gabion mattresses are assembled by laborers. Geotextile is installed by laborers. Associated practices are Grassed Waterway (412), Diversion (362), and Critical Area Seeding (342).

**Scenario Feature Measure:** Volume of Rock**Scenario Unit:** Cubic Yard**Scenario Typical Size:** 28**Scenario Cost:** \$11,736.42**Scenario Cost/Unit:** \$419.16**Cost Details (by category):**

Component Name	ID	Component Description	Unit	Price (\$/unit)	Quantity	Cost
<b>Equipment/Installation</b>						
Dozer, 200 HP	928	Track mounted Dozer with horsepower range of 160 to 250. Equipment and power unit costs. Labor not included.	Hour	\$158.64	24	\$3,807.36
Backhoe, 80 HP	926	Wheel mounted backhoe excavator with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	\$47.65	16	\$762.40
<b>Labor</b>						
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	\$37.95	16	\$607.20
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12", Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	\$23.61	40	\$944.40
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	\$18.11	32	\$579.52
<b>Materials</b>						
Geotextile, non-woven, heavy weight	1210	Non-woven greater than 8 ounce/square yard geotextile with staple anchoring. Materials and shipping only.	Square Yard	\$4.01	112	\$449.12
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic yard	\$23.93	10.7	\$256.05
Gabion basket or mat	1378	Gabion baskets or mats installed and filled on grade, includes materials, transport, equipment, and labor, does not include geotextile fabric.	Cubic Yard	\$132.05	28	\$3,697.40
<b>Mobilization</b>						
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	\$415.40	1	\$415.40
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	\$217.57	1	\$217.57

**Practice: 468 - Lined Waterway or Outlet****Scenario: #6 - Outlet, Concrete Lined****Scenario Description:**

Install an open weir concrete lined outlet to control soil erosion and/or provide a stable outlet for other conservation practices. Minor excavation and/or earhfill is required to install the structure for foundation and support embankments. The typical structure is 30 ft long and requires 12.8 cy of concrete. The concrete is reinforced with welded wire fabric. Cost include earthwork, 6" of clean sand or gravel subgrade, and 5" reinforced concrete slab.

**Before Situation:**

Excessive sedimentation and soil erosion is occurring as a result of ephemeral or classic gully erosion. Velocities are generally too high or saturated soil conditions make it difficult to establish a stable vegetated outlet.

**After Situation:**

An open weir concrete lined outlet is installed. Minor excavation and/or earhfill is required to install the structure for foundation and support embankments. The typical structure is 30 ft long and requires 12.8 cy of concrete. 21 cubic yards of subgrade bedding material. Earthwork and bedding material are installed using a dozer and laborers. Concrete is placed, graded and screeded by laborers. Associated practices are Grassed Waterway (412), Diversion (362), Waste Storage Facility (313), Waste Treatment Lagoon (359), and Critical Area Seeding (342).

**Scenario Feature Measure:** Volume of Concrete

**Scenario Unit:** Cubic Yard

**Scenario Typical Size:** 13

**Scenario Cost:** \$6,618.72

**Scenario Cost/Unit:** \$509.13

**Cost Details (by category):**

Component Name	ID	Component Description	Unit	Price (\$/unit)	Quantity	Cost
<b>Equipment/Installation</b>						
Earthfill, Roller Compacted	49	Earthfill, roller or machine compacted, includes equipment and labor	Cubic yard	\$3.73	397	\$1,480.81
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic yard	\$4.90	89	\$436.10
Concrete, CIP, formed reinforced	38	Steel reinforced concrete formed and cast-in-placed in formed structures such as walls or suspended slabs by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	\$313.38	12.8	\$4,011.26
<b>Labor</b>						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	\$18.11	2	\$36.22
Supervisor or Manager	234	Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc.	Hour	\$37.95	4	\$151.80
<b>Materials</b>						
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic yard	\$23.93	21	\$502.53